The Destiny of the Information Center

INPUT®

THE DESTINY OF THE INFORMATION CENTER

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CONTENTS

EXHIBITS

I INTRODUCTION

A. PURPOSE

- This report is part of INPUT's End User Planning Program. It identifies the future information systems environment with emphasis on the role of the information center. It provides a realistic view of how the information systems function will evolve over the coming decade.

- The report answers the following questions:

  - What responsibilities are typically assigned to the information center? Why?

  - What impact has the flurry of microcomputer activity had on the information center?

  - What are the biggest challenges facing the information center?

  - How will systems development be approached in 1995?

  - What is likely to happen to the functions known as the information center and end-user computing support?

B. SCOPE

- This report will focus on the analysis of the information system events that are likely to take place during the forthcoming decade. It will examine the IS organizational ramifications of integrating end-user computing, office automation and data processing. Emphasis will be placed on the evolution of the information center. This report does not address the technical issues associated with the information center nor does it identify specific product features. Instead, it deals primarily with tactical and strategic issues surrounding end-user computing and associated functions.

- The following people should find this report pertinent:

  - IS senior management.
  - Information center management.
  - Managers of systems development.
  - End-user managers.
  - Senior corporate managers.

C. RELATED INPUT REPORTS

- Update on the Information Center.

  - This report examines and analyzes current product offerings, significant developments, emerging technologies, and important issues and trends.

- Information Systems Implications of IBM Software Strategies.

  - This report provides an in-depth analysis of IBM software directions for the next 20 years.

- Training: Prequisite to End-User Computing.

  - This report identifies the issues emerging from the ever growing end-user training requirements and recommends specific planning steps.

- The Resurrection of Distributed Data Processing.

  - This report forecasts the role of DDP in the corporate computing strategy and examines the impact of LANs and micro-mainframe links on the DDP concept.

- The Changing Dynamics of IS Organizations (mid-1985).

  - This report will forecast IS organizations' trends and recommend strategies that will improve IS responsiveness to the corporations' competitive needs.

- Micro-Mainframe: Corporate Impact (mid-1985).

  - This report will examine the organizational and technological effects of microcomputers in the corporation.

II EXECUTIVE SUMMARY

- The executive summary is designed in presentation format in order to:
  - Help the busy reader quickly review key research findings.
  - Provide an executive presentation, complete with script and exhibits, to facilitate group communication.
- The key points of this entire report are summarized in Exhibits II-1 through II-5. On the left-hand page facing each exhibit is a script explaining the exhibit's contents.

A. THE CENTER WILL DISAPPEAR

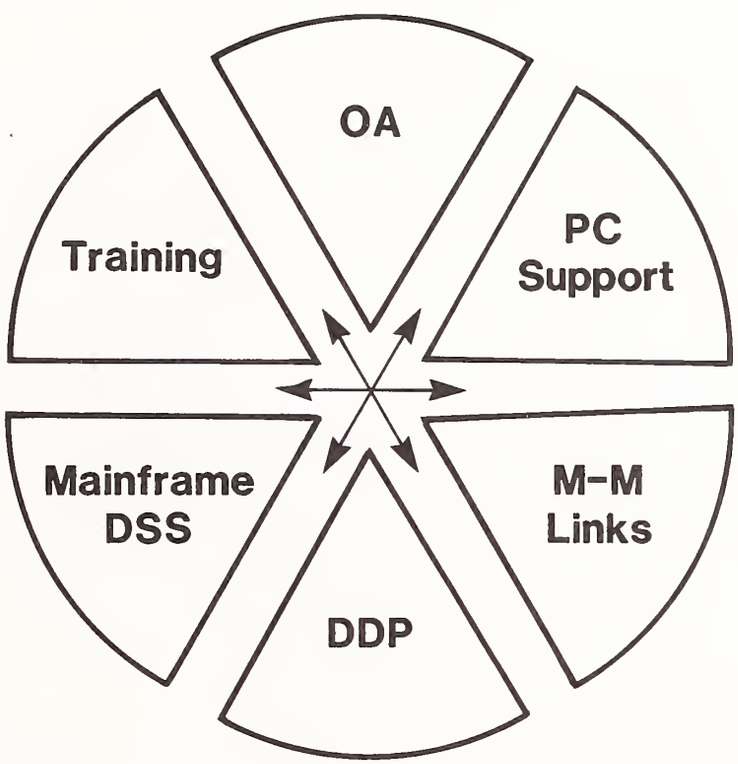
- The information center was devised by IBM in the mid-1970s to give users the ability to help solve some of their own information systems problems. The idea of a walk-in center, where users could learn to write programs in fourth generation languages, didn't become widely accepted until the early 1980s. Some organizations are just now in the process of installing their first information centers.

- These walk-in centers have played, and are still playing, an important role in the evolution of end-user computing. They have demonstrated the capabilities of the computer to users and have introduced decision support systems.

- The center, however, is phasing out. It is giving way to a more powerful and convenient device--the microcomputer. With the microcomputer, end users can remain at their own workstations and either emulate an information center 3270 terminal or perform decision-making functions on their stand-alone microcomputers.

- With more sophisticated micro-mainframe links and the installation of processors at the departmental level to support end-user computing and office automation, there will be less need for the information center. Even centralized training will be replaced by improved computer-based training.

THE CENTER WILL DISAPPEAR



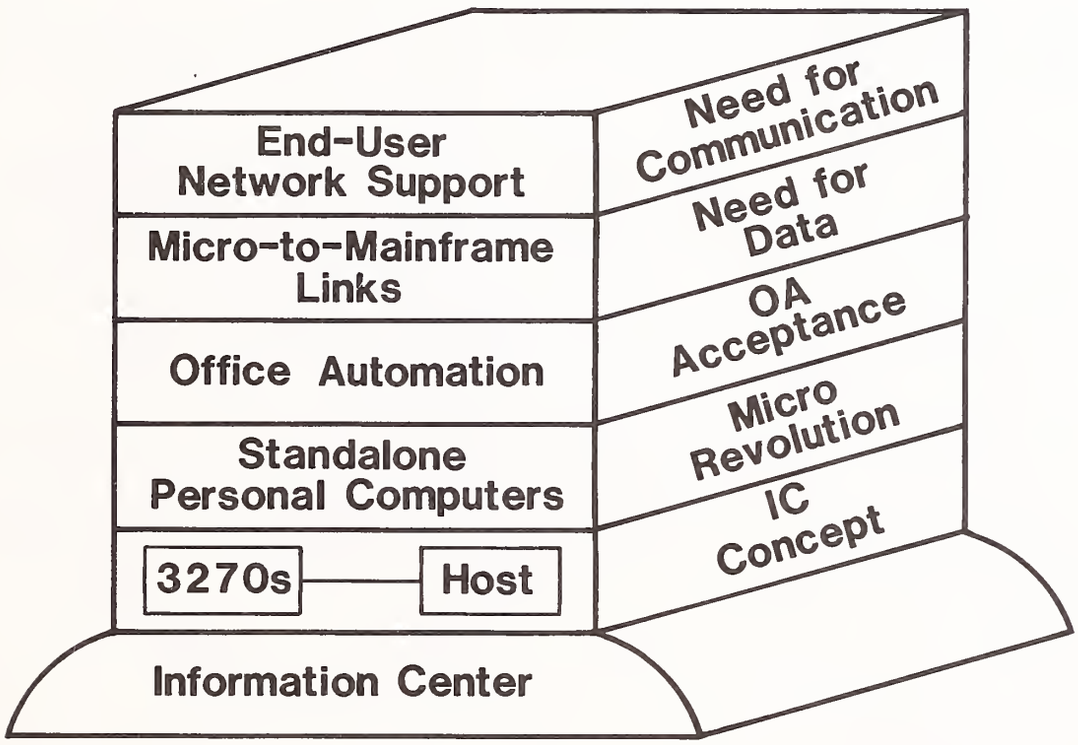
B. THE RESPONSIBILITIES OF THE INFORMATION CENTER ARE GROWING

- Information Systems (IS) management did not anticipate the overwhelming success of products marketed to support end-user computing. Very little planning in the area has taken place, primarily because the impetus has come not from IS, but rather from the vendors and the end users themselves.

- IS management has viewed microcomputers and office automation products as issues to deal with and have, therefore, handed them over to the information center. In the mind of IS management, there has been a differentiation between end-user computing and traditional data processing systems.

- IS management must realize that the information center is becoming a full-fledged information systems department with capabilities of developing comprehensive information systems and the ability to compete with the systems development staff in providing service to end users.

THE RESPONSIBILITIES OF THE INFORMATION CENTER ARE GROWING



C. THE NEED FOR TRAINING AND CONSULTING WILL CONTINUE TO GROW

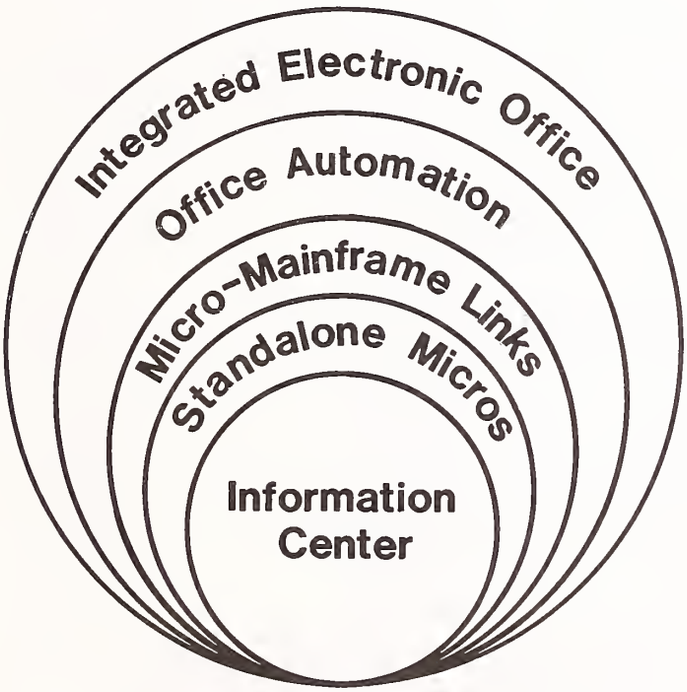
- The total installed base of microcomputers in all businesses with revenues greater than $10 million is approximately four million units. This figure will more than double by 1989.

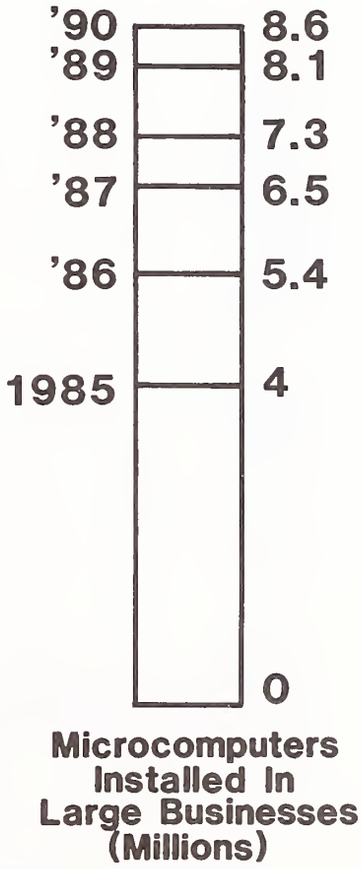
- In 1984 90% of the installed base of microcomputers were standalone units, but by 1990 INPUT predicts that the percentage of standard microcomputers will drop to only 30%. The remaining 70% will be sharing resources through local area networks (LANSs), multiuser systems, and micro-mainframe links.

- Not only will there be millions of new end users to train during the next five years, but the progressive integration of functions will produce more complex systems and comprehensive software. Users will be unable to develop these new capabilities without assistance from IS consultants.

- This projected shift from a centralized control of information systems resources to dispersed networks of microcomputers sharing data and processing capabilities with other computers, adds credence to the predicted demise of the information center.

THE NEED FOR TRAINING AND CONSULTING WILL CONTINUE TO GROW





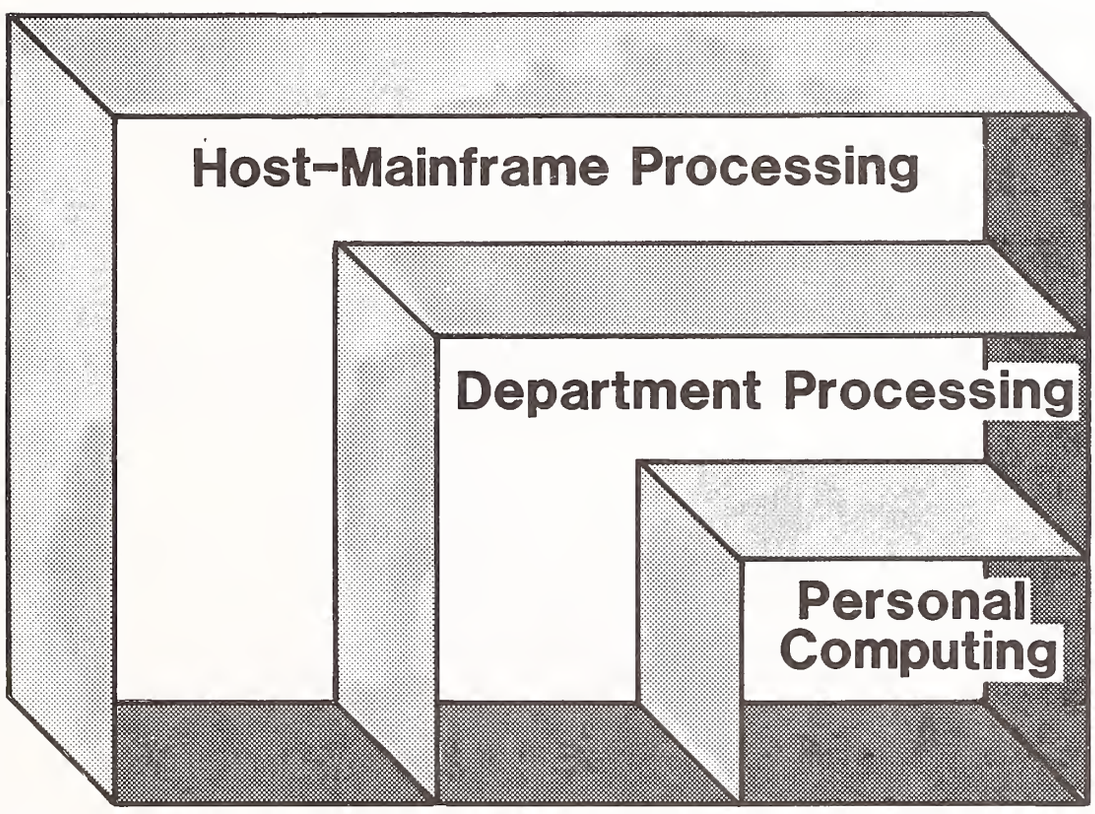
D. INTEGRATION IS INEVITABLE

- IBM's strategy has been characterized by continued centralization of control through SNA/VM/MVS central host systems. The information center concept fits into this strategy. INPUT believes this centralization of control will continue through the 1980s.

- During the past five years there has been a tremendous growth in the installation of standalone microcomputers and office automation systems. Some office automation systems are supported by independent processors installed in various locations within an organization. To this point, end-user computing, office automation, and data processing have been headed down their separate paths.

- IS organizations and IBM (as well as other hardware/software/communications vendors) recognize the need to integrate these three separate information systems services to facilitate the sharing of information and resources. INPUT believes this integration will be emphasized between 1990 and 1995, and INPUT identifies this as the Electronic Office period.

INTEGRATION IS INEVITABLE



E. SEPARATE FUNCTIONS WILL MERGE

- Presently, the data processing systems development function has little involvement with the activities of the information center or office automation functions. Each function has its specialists who work with users to solve specific information system problems.

- INPUT sees evidence that these functions have started to merge. Meetings are taking place between the staffs of these functions to share ideas and formulate mutual plans. Information center representatives are being requested to attend data processing systems projects meetings to identify the information needs of end users.

- INPUT believes that future systems will be designed to accommodate the information needs of corporate, regional, divisional, departmental and individual contributors.

- Once the total merger takes place during the Electronic Office period, end-user computing and office automation will become subunits within the IS systems development function. This will be the end of the information center era.

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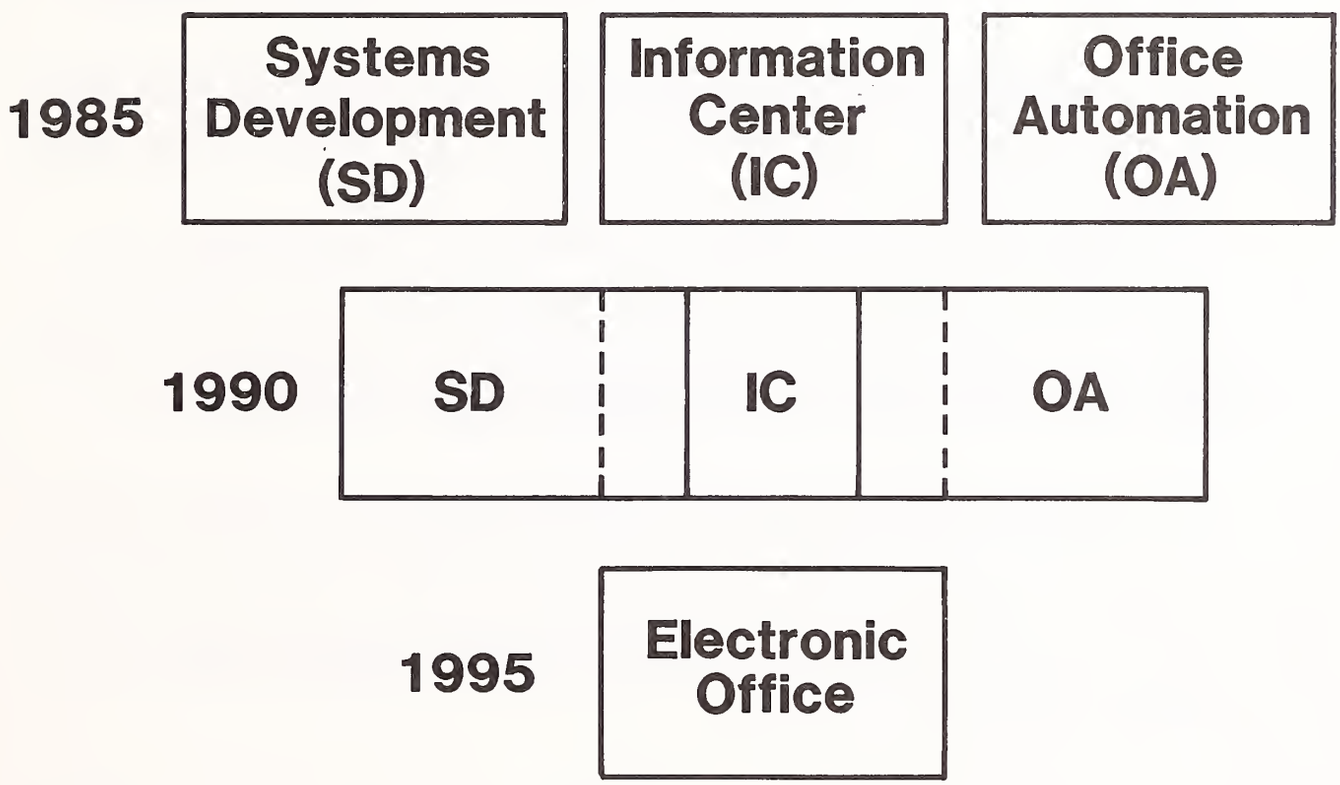
SEPARATE FUNCTIONS WILL MERGE



F. PREPARE FOR THE INTEGRATED ELECTRONIC OFFICE PERIOD

- Training and education requirements will more than double during the next four years due to the increased number of end users and the complexity of software products. IS should continue to evaluate training methodologies and develop training plans that parallel the anticipated end-user computing evolution. Business consulting skill should continue to be recruited and developed.

- The collaboration between the information center staff and the traditional systems development staff should be promoted by developing organizational plans that align the two functions under the same manager.

- An in-depth evaluation of available micro-mainframe links should be conducted to identify and acquire those links that are compatible with the existing mainframe data base environment and microcomputer software.

- The central host mainframe will be unable to handle the increased load generated by the Electronic Office period. If not already under way, small mainframe, supermicro, or minicomputer systems should be evaluated for installation at the departmental level to handle local office automation and end-user computing requirements.

- Before making a total commitment to a product or concept, test it thoroughly in a controlled situation. The Electronic Office period will bring about major changes in how organizations handle their information systems needs. A well thought-out plan mapping the evolutionary steps will be essential to the success of the Electronic Office period.

INPUT®

PREPARE FOR THE INTEGRATED ELECTRONIC OFFICE PERIOD

- Emphasize Training and Consulting
- Promote Systems Design Collaboration
- Install Bidirectional Micro-Mainframe Links
- Evaluate Departmental Processors
- Pilot New Concepts

III THE INFORMATION CENTER'S EXPANDING RESPONSIBILITIES

A. THE ORIGINAL CHARTER

- The origin of the information center concept dates back to the announcement of IBM's Report Program Generator (RPG), circa 1960. The backlog of requests for data processing services has been a problem from the start of computers in business. The idea of RPG was to provide users with a simple-to-use, parameter-driven language by which they could produce ad hoc reports. The information systems (IS) departments would designate programmers to assist users with RPG.

- As teleprocessing equipment became a standard interface between IS and users, and interactive systems software became available to facilitate time-sharing, some users began developing on-line programs in languages such as APL and FORTRAN, under TSO. This type of user was normally found in engineering departments or in research and development.

- The first actual information centers were set up in rooms located near the data center and equipped with several IBM 3270 display terminals and remote printers. The information center's staff assisted end users in obtaining access to specific mainframe-maintained data through query facilities and then assisted them in the use of analysis and reporting software tools.

- Generally, the initiation of the information center concept has been approached with caution. VM/CMS or TSO and the associated information center systems software has normally been installed on existing production mainframes. Pilot end-user business units have been selected to evaluate the concept before making a total commitment. Typically, the information center staff would start with one or two people from the systems development function.

- INPUT believes that IS management was surprised by the overwhelming success of the information center. In a 1983 survey, INPUT asked IS managers to predict who would be the most active users of the information center by 1985. In Exhibit III-1 the results of the 1983 survey are on the left and indicate that IS managers thought clerical staff would be the big users, followed by the professional programming staff. This prediction could have been based on the RPG experience, where the programmers helped department clerks produce reports as requested from line supervisors and managers.

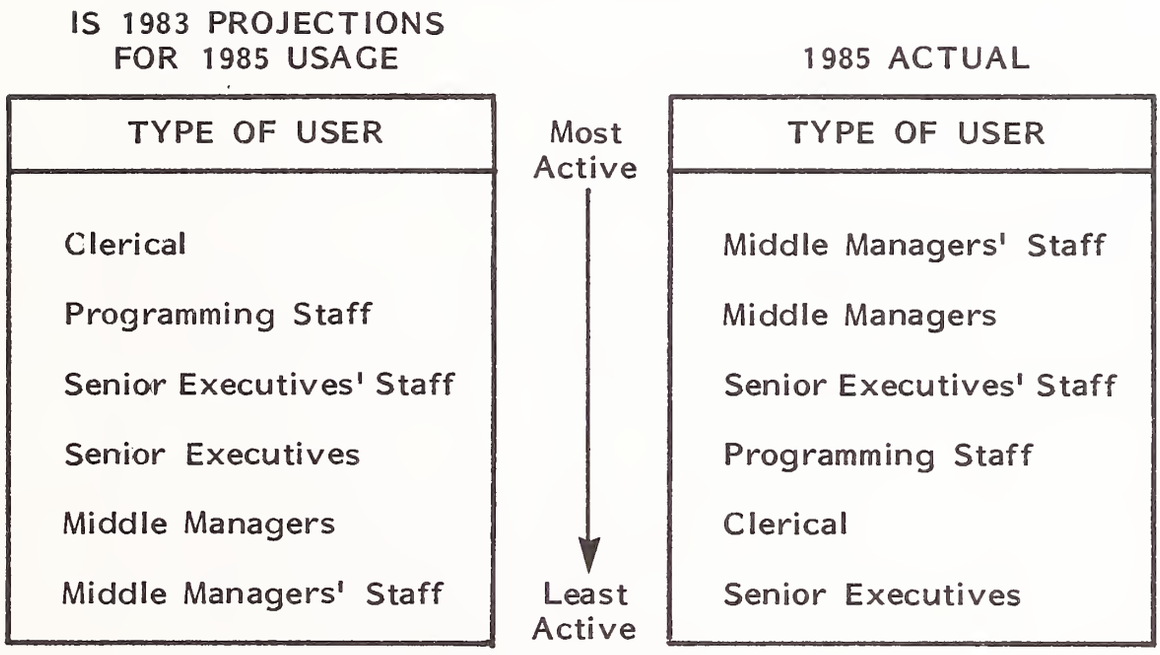
- The information on the right side of Exhibit III-1 shows the type of users that are actually active users of the information center in 1985. The two most active users are middle management and the supporting staff, which includes professionals such as financial analysts and business planners. The reason for the shift is the emphasis on the decision making support capabilities of the information center and the fact that microcomputer usage is now under the control of the information center.

B. THE PERSONAL COMPUTER CATALYST

- The acceptance of the personal computer by middle management as a decision support tool has added a new dimension to the responsibilities of the information center, which now include:

EXHIBIT III-1

WHO USES THE INFORMATION CENTER?



- Microcomputer compatibility standards.

- Microcomputer software selection.

- Micro-mainframe linkage.

- Microcomputer software training for end users.

- Microcomputer users' group coordination.

- Microcomputer equipment selection.

- The IS community, in general, did not realize how significantly the advent of the microcomputer would impact its role. The IS managers knew that the uncontrolled proliferation of microcomputers was something to grapple with, but they didn't view this new information tool as an oppurtunity to improve overall information system services.

- The information center has been given the responsibility of controlling and administering the use of microcomputers, primarily because end users are performing functions on microcomputers similar to those performed in the original information centers; data manipulation, analysis, reporting and graphics.

- Will the microcomputer eliminate the need for an information center? The answer is yes and no. With standalone micros, remote video display terminals, and micro-to-mainframe links the concept of the "center" will disappear. Knowledge workers and information handlers aren't required to come to a center to build computer-based business models and perform "what if" analyses. They can perform these decision support functions at their individual workstations.

- The part of the information center that will not disappear, and instead will grow considerably over the next few years, is the end-user computing support staff. More and more microcomputers are being installed in businesses, as shown in Exhibit III-2. The installed base of four million microcomputers in 1985 will more than double over the next four years. This means that literally millions of workers will have to be educated in how to apply these new tools and associated software products.

- Micros are working their way into every aspect of services performed by the information systems functions. INPUT is predicting that within the next decade micros will be an integral part of most every information system project. This will force collaboration between the end-user support staff (information center) and the systems development staff.

- The end-user computing support staff will continue to grow until such time that production systems are designed with the personal computing needs of the end users taken into consideration. Once the systems development staff exploits the functionality of the microcomputer, the "information center" will do less applications work and more training and consulting (evaluating the alternatives rather than implementing a solution).

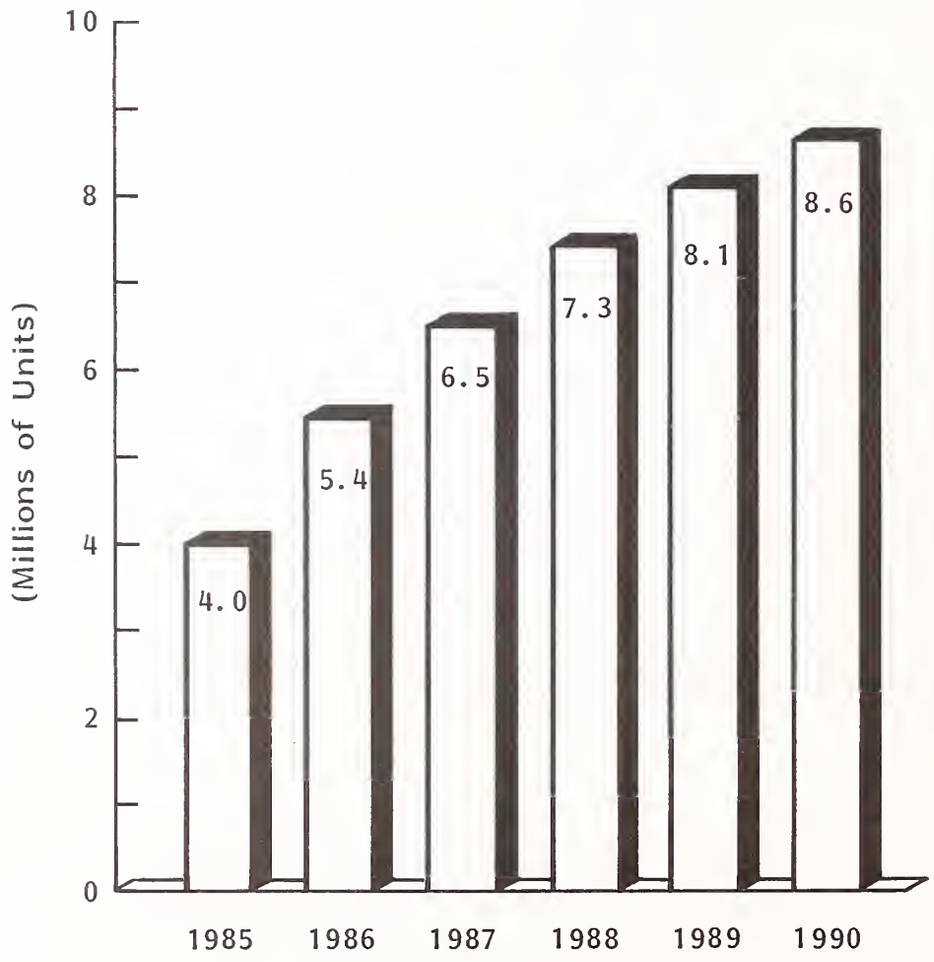
C. OFFICE AUTOMATION POPULARITY

- Automating the day-to-day functions of office workers has been an issue facing IS for more than a decade. The big problem in selling office automation to senior management has been the inability to accurately measure the intangible benefits of electronic mail, electronic filing, and administrative support features.

- Most electronic office systems have started with word processing products because the typing function produces a tangible product. Productivity

EXHIBIT III-2

MICROCOMPUTER INSTALLED BASE FOR
BUSINESSES WITH REVENUES GREATER THAN $10 MILLION



improvements could therefore be identified and office system equipment could be cost justified.

- In the beginning of the word processing era, IS was cognizant of equipment installations and perhaps got involved in vendor selection, but did not have responsibility for planning and managing office automation activities.

- INPUT believes the resistance to automating the office functions associated with interpersonal communications was lowered through the acceptance of the information center and personal computers. White-collar workers have become familiar with the capabilities of computer-based office systems products and have come to rely on these information resources.

- The move is toward the integration of office systems with hardware and software products that provide:

  - Word processing.
  - Electronic mail.
  - Electronic filing.
  - Personal time management.
  - Financial modeling and spreadsheets.
  - Query and report preparation.
  - Data base management.
  - Graphic preparation.
  - Links to corporate data bases.

- The supplies of products directed at knowledge workers and information handlers are avoiding the term "office automation" in favor of titles that imply a more encompassing system. IBM chose "Professional Office Systems," Data General went with "Comprehensive Electronic Office Systems," and DEC prefers "Multifunction Office Systems."

- Because these office systems are designed for executives, management and professionals, as well as secretaries and other clerical support personnel, they become intertwined with other end-user computing activities. Office automation will be viewed as a competitive weapon that can provide an edge in productivity and decision making.

- With the scope of office systems expanding, there is an overlap between these systems and the services provided by the information center. IS management has recognized this overlap of functions and has, therefore, given the coordination of office systems to the information center manager.

D. END-USER CONSULTING SERVICES

- As mentioned earlier, the emphasis of the information center will focus on providing end users with professional advice for formulating solutions to their business problems.

- The end-user consultant should be able to grasp the business problem and select the most suitable alternative, which could be:

  - Standalone personal computer.

  - Mainframe decision support software.

- Micro-mainframe linkage.

- Mainframe production system.

- Office system.

- Manual system.

- Requests for information systems services from end users that are not certain about how the request might be satisfied should be forwarded to an end-user computing consultant. It becomes the consultant's responsibility to analyze the request and evaluate the various alternatives.

- The use of hotline services is becoming prevalent because of the trend toward end users attempting to formulate the solutions to their business problems directly from their workstations. Many questions can be answered by the consultants in a phone conversation.

- In large organizations that will require many end-user consultants, business units should have consultants assigned to them. This will foster working relationships and will allow the consultants to concentrate on specific business functions so that they can become more knowledgable about business dynamics.

E. THE MASSIVE TRAINING PROBLEM

- Training and education have always been major issues facing the IS manager. Technology advances so rapidly it becomes extremely difficult to stay abreast of all of the changes. Keeping IS professionals up-to-date and corporate management familiar with the capabilities of computer resources has been a big enough task. Now the IS manager is faced with an even bigger task--training and educating end users in how to use and apply computer technology.

- Exhibit III-3 shows that at each step of the end-user computing evolution (the specific time will vary among organizations) the number of end users requiring training will increase. Each new end-user computing initiative creates a larger training snowball.

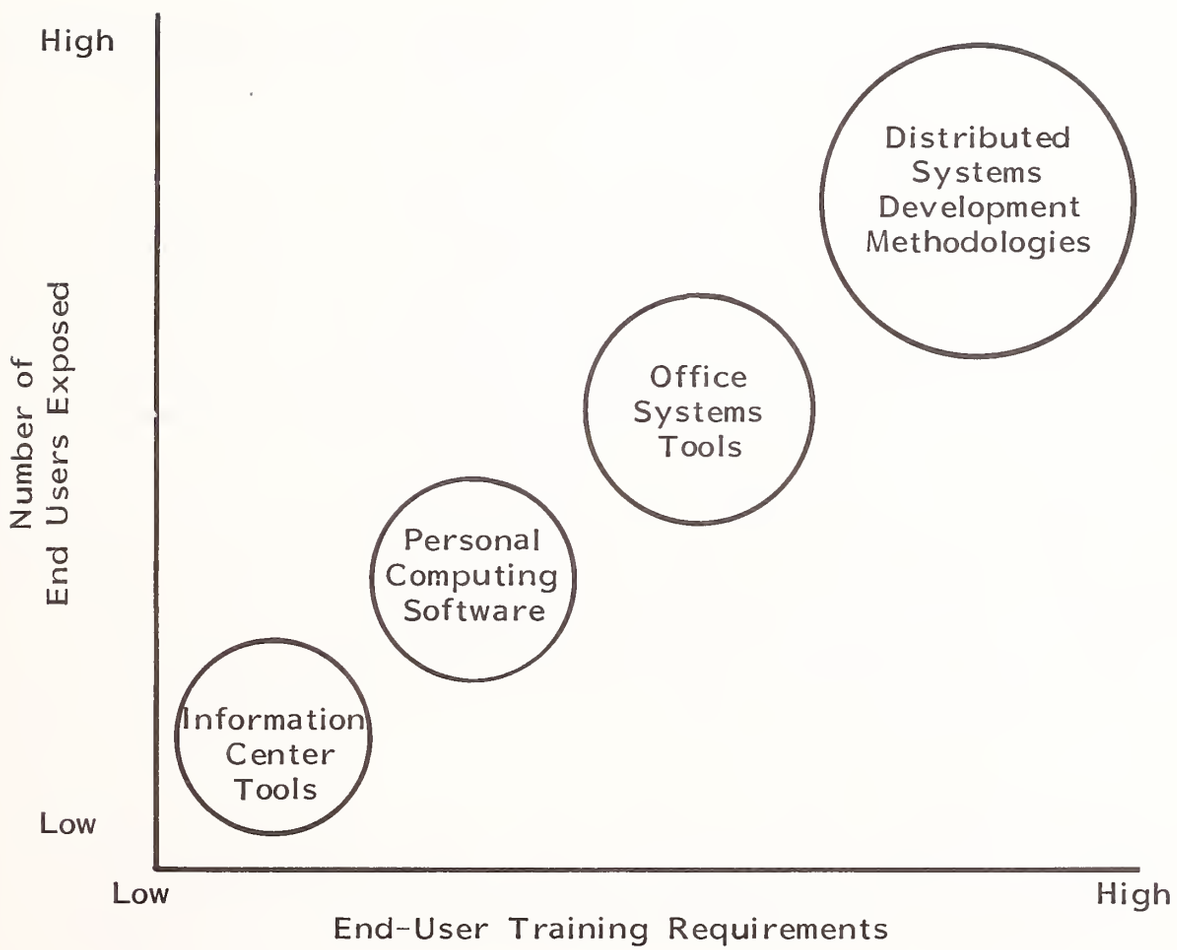
- The original information center attracted a limited number of users, and training was accomplished mostly on a one-on-one basis. Personal computers have reached a much larger user population, making it necessary to investigate mass training methods. The new integrated office systems penetrate the work force even further and introduce a greater number of products. When personal computing, office systems, and production data processing systems become fully integrated, the technology will have to be learned by every executive, manager, professional, and administrative support worker. This is becoming a serious problem for the information systems manager.

- In the report Training: Prerequisite to End-User Computing INPUT recommends the establishment of a formal training and education function within IS that would have the responsibility for all IS training and education issues, including those associated with end-user computing. The support staff of the information center might conduct courses on specific end-user computing products, but planning and the selection of techniques and methods should be done by the formal training and education functions.

- To date, training end users on mainframe information center products and personal computers has been relegated to vendors or information center staff. INPUT doesn't believe that this approach will get the job done effectively. A formal group with various training techniques and methods, along with an overall training and education plan, will provide what is needed in this area.

EXHIBIT III-3

THE GROWING TRAINING PROBLEM



IV I.S. MANAGEMENT'S VIEW OF THE INFORMATION CENTER

A. "GARBAGE CAN" FOR END-USER COMPUTING INITIATIVES

- Inadvertently, IS managers are creating new empires within their own empires by handing over the responsibility for any function related to end-user computing to the manager of the information center. The information center has become a "garbage can" for these rapidly emerging end-user computing initiatives, as depicted in Exhibit IV-1.

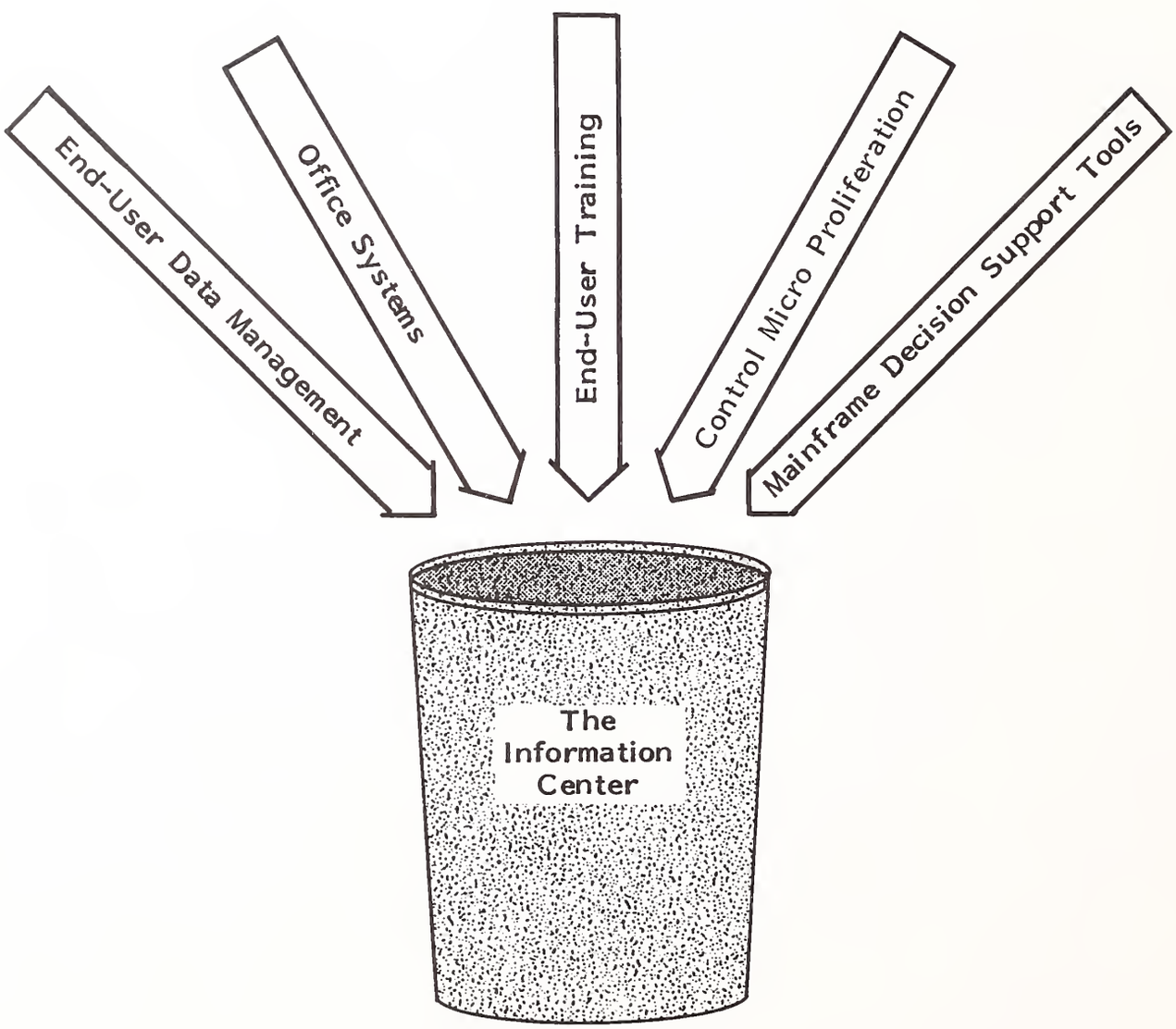
- What started as a place where IS users could gain access to computer-stored data to satisfy some of their individual information analysis needs has turned into a place where IS users can build integrated office systems with all the functionality (including communications) of the host-based production applications systems.

- This garbage can strategy only makes sense if there are policies and procedures in place that guard against user/information center systems development that circumvents the established standard system development methodologies.

- If users are starting to turn to information centers to build transaction-driven systems, thereby avoiding the bureaucracy associated with the IS systems development staff, then it is time to reassess the goals and objectives of the information center and lay down guidelines that define where end-user computing ends and standard systems development methodologies begin.

EXHIBIT IV-1

HOW I.S. MANAGEMENT HANDLES THE
END-USER COMPUTING INITIATIVES



- These systems development parameters should be established through the joint efforts of the IS manager, the manager of systems development, and the manager of end-user computing support. One of the primary responsibilities of end-user consultants is to determine the most appropriate alternative for an information service request.

- There is a fine line between giving end users the flexibility to design and implement information systems and losing control of the information systems resources. The end users are on a path that parallels the evolution of data processing. Without proper guidance, end users will repeat the same mistakes that the information systems services industry has encountered during the past 30 years.

B. STAFFING THE INFORMATION CENTER

- The information center managers surveyed for this study believe their staffs should be doubled by 1987. This lends credence to the presumption that IS managers are unloading more responsibilities on information center managers, brought about by the demands of the end users.

- Job titles vary because norms have not been established and tasks keep expanding. The following is a representative sample of job titles found in the information centers survey for this study:

  - Information Center Consultant.

  - Information Center Product Specialist.

  - User Consultant.

- Business Analyst.

- Office Technology Trainers.

- Personal Computer Analyst.

- Information Center Analyst.

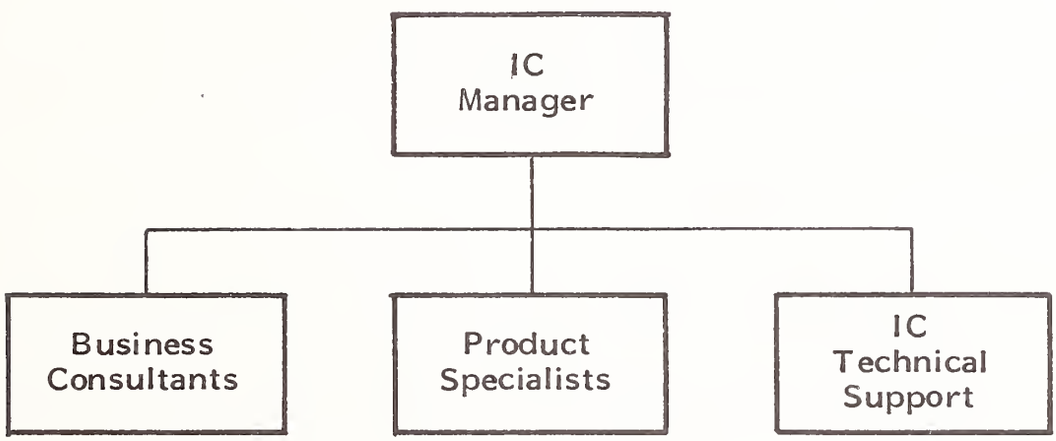
- There is a definite differentiation between those people who service PC users and those who service mainframe users. This differentiation will diminish as microcomputers, mainframes, and office systems become more integrated.

- Exhibit IV-2 lists the types of expertise that should be found in today's typical information center. Business consultants work with end users in the formulation of a solution to an information systems problem. Consultants should possess in-depth knowledge of the areas of the organization being serviced. Product specialists are just that; experts in the use of end-user computing tools. The technical support personnel of the information center are concerned with developing compatibility standards and guidelines for users to follow, along with the evaluation and selection of information center hardware (micro) and associated systems software (operating systems). The technical support staff should also be responsible for recommending LANs and linkage products to the telecommunications staff.

- The size of the staff varies depending on the scope of the information center responsibilities. Where mainframe products, micro, and office systems are under the purview of the information center, it's not unusual to find the information center representing more than 10% of the total IS population.

EXHIBIT IV-2

STAFFING THE INFORMATION CENTER



- Problem Analysis
- Evaluation of Alternatives
- Liaison to IS Systems Development

- Mainframe Software
- PC Software
- PC Configurating
- Hotline
- Training
- Office Systems
- User Contact

- Standards
- Systems Software
- Hardware/Software Evaluation
- LANs
- Micro-Mainframe Links
- Custom Programming
- Liaison to IS Technical Support Staff

C. THE BACKLOG AND THE INFORMATION CENTER

- The majority of the work generated for the information systems development staff falls under one of the following categories:
  - A new product line.
  - Regulatory changes.
  - Marketing innovations.
  - Customer service.
  - Operational efficiency.
  - Productivity improvements.
  - Application package implementation.
- Information regarding the performance of the various business units of an organization is usually in the form of an on-line inquiry or a periodic report. This management information is normally designed into a production system as a byproduct of business transaction processing.
- IS has always been weak in providing the business user with interactive decision support capabilities. Many financial analysts turned to remote computer services vendors to build interactive financial models and perform "what if" analyses.
- The advent of the information center has probably had little or no effect on the amount of work facing the systems development staff. What the information center (and related tools) has done is open an entirely new information avenue to end users: decision support.

- Users are pleased with these new tools because they play an important role in improving an individual's daily performance, a service that has heretofore not been available from IS. Users have, however, been able to satisfy some of their requests for new reports through the information center, but this has had an insignificant impact on the IS workload.

- Overall, the backlog of requests for IS service has probably increased due to the shift of work from systems development to the information center. IS hardware and human resources are still being used to satisfy requests; the only thing that has changed is the form in which the service is rendered.

V WHERE IS THE INFORMATION CENTER GOING?

A. THE FUTURE CHARTER AND THE "BIG BANG" THEORY

- During the next several years there will be more changes in the basic principles of how IS conducts its business than have been seen since the introduction of the video display terminal in the 1960s. These changes will manifest themselves in the form of:

  - Standalone personal computers.
  - Personal computers sharing resources through LANs.
  - Personal computers communicating and exchanging data with other micros.
  - Micros linked to departmental processors.
  - Departmental processors linked to host mainframes.
  - Personal computers linked to host mainframes.
  - Distributed system development.
  - Electronic office systems.

- The information services industry resembles the "big bang" theory of the universe. Just as the universe began as a tremendous, tightly-packed atom that exploded to create the galaxies, so has IS been a tremendous, tightly-packed atom of mainframes and support personnel. The explosion of microcomputers is forming galaxies of end-user computing. Some astronomers believe that once the universe reaches its maximum expansion it will start to contract to its original super-giant atom form.

- The information systems universe reached its maximum expansion when users started bringing in microcomputers in every size, shape and form. It has now started to contract, evidenced by IS's steps toward tighter control over the proliferation of microcomputers, and the formation of end-user support groups.

- Now the IS universe is at the stage of searching for the perfect balance of galaxies, which INPUT believes will involve an integrated network of computer resources that service the information needs of individuals, departments, and corporate headquarters.

- The information center, with its microcomputer and office systems support, represents a major step toward the integration of information resource galaxies. The charter of the information center should be clearly defined and the necessary resources allocated for it to carry out its mission.

- Eventually (possibly as early as 1990 for some organizations) the information center will be disbanded and the individual specialists will become a section within the systems development department. The business consultants of the information center will work with the system development staff to formulate solutions to information systems problems of the various business units of the corporation. Business consultants may become part of the business units being serviced to act as liaison and provide expertise on end-user computing products. End-user training will become the responsibility of the IS training

department. Technical issues related to end-user computing will be assigned to the mainframe technical support group.

- Because office automation crosses departmental lines, this activity will be handled by a separate group within the information systems development department. Specialists from the office automation group will be assigned to systems development projects to represent needs of the office workers in the areas of interpersonal communications and administrative support. This coordination will become increasingly important as information systems resources become more tightly integrated and more automation tasks are handled by departmental processors.

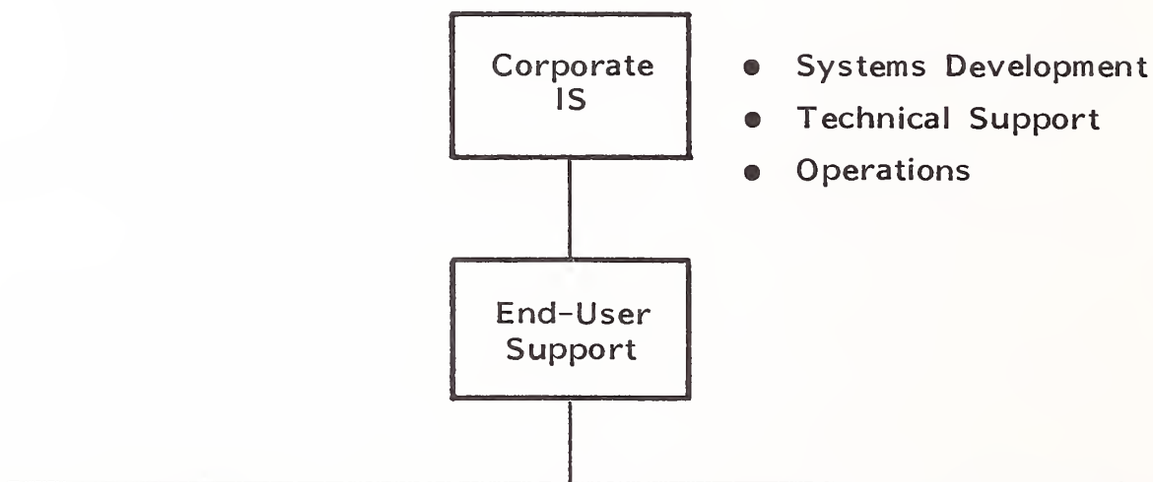
- Arriving at an organizational structure that will facilitate the development of integrated data processing, end-user computing, and office automation systems (and remain proactive to the needs of the individual end user) will be the forthcoming challenge for IS management. These organizational issues will be examined in INPUT's upcoming report The Changing Dynamics of IS Organizations.

- Until the time when information systems services become dispersed to departmental processors and microcomputers through integrated networks, there will be a need for a separate end-user support group as outlined in Exhibit V-1. This group can be called the information center, or end-user support, or decision support, or any descriptive name, but it should be comprised of the following four functions:

  - Technical support. This function is primarily responsible for evaluating available products in the end-user computing market for inclusion on the list of approved hardware and software resources for end users. These products include micro-mainframe links and LANs. End-user computing policies and procedures are also under this function.

EXHIBIT V-1

THE EMERGING INFORMATION CENTER CHARTER



TECHNICAL SUPPORT	MARKETING
• Standards & Guidelines • Hardware/Software Selection • Links/LANs • Planning	• Micro Store • Demos • Newsletter • Pilot Projects • User's Group Liaison
OFFICE SYSTEMS	**CONSULTATION**
• Word Processing • Electronic Mail • Correspondence • General Administration & Management	• Business Needs Assessment • Data Management • Training • Product Assistance • Systems Development Liaison

- Marketing. This is a relatively new concept and encompasses the areas of promotion and general communications related to the services provided by the end-user support department. This function is responsible for assisting end users in selecting the best configurations of hardware and software. Marketing is also the IS coordinator for the formulation and function of any user's groups. The end-user computing newsletter is published by the marketing function.

- Office systems. This function conducts needs assessments for corporate office automation and provides the planning and implementation assistance necessary to ensure a smooth transition from normal to automated systems. This function interfaces with the other corporate IS departments to assist in the management of resource utilization and to coordinate project integration.

- Consultation. This function consumes at least 50% of the human resources of the information center. The consultants help end users determine the best solution to their individual information systems problems and provide assistance in the use and application of specific end-user computing tools. Consultants can conduct one-on-one training sessions or they can conduct classroom courses on the available products.

- In smaller organizations that can support only a few employees in the information center there will be an overlap of duties. The consultants in some information centers may be required to be involved in all four functions. Developing the right skills mix is a critical issue because of the limited human resources.

B. SKILLS MIX REQUIREMENTS

- In the report Future Skills Requirements for Software Development INPUT stresses the need for people with interpersonal communications skills who have the capacity to learn the technology quickly and who have good business perspectives. This is the type of candidate that should be recruited for the group that works directly with end users.

- The individuals assigned to the information center function must enjoy assisting and tutoring others. They should be good teachers both as classroom instructors and as mentors. As good teachers they should be able to master new subjects (software packages) quickly.

- Exhibit V-2 lists the primary skills that should be required of those in the information center. It would be very fortunate, but very rare, to find an individual who possesses an adequate level of all of the skills required. Working with users does require good interpersonal skills and a grasp of the business functions being serviced. These are the top requirements, followed by technical competence.

- Where are IS managers finding these skills? The answer is, just about anywhere. INPUT's surveys for the information centers studies have uncovered a variety of sources for information center recruits, including:

  - Systems analysts.
  - Programmers.
  - Secretaries.
  - Administrative assistants.

EXHIBIT V-2

THE INFORMATION CENTER
SKILLS MIX REQUIREMENTS

- Interpersonal Communication Skills
- In-Depth Understanding of the Business
- Technical Competence
- Analytical/Problem Solving Capabilities
- Teaching Skills (Training, Coaching, Counseling)
- Selling Skills (New Techniques, Ideas, Concepts)
- Coordinating Abilities (Vendors, IS Systems, Projects)

- Business/financial analysts.

- Public school teachers.

- Recent MBA graduates.

C. END-USER COMPUTING EVOLUTION

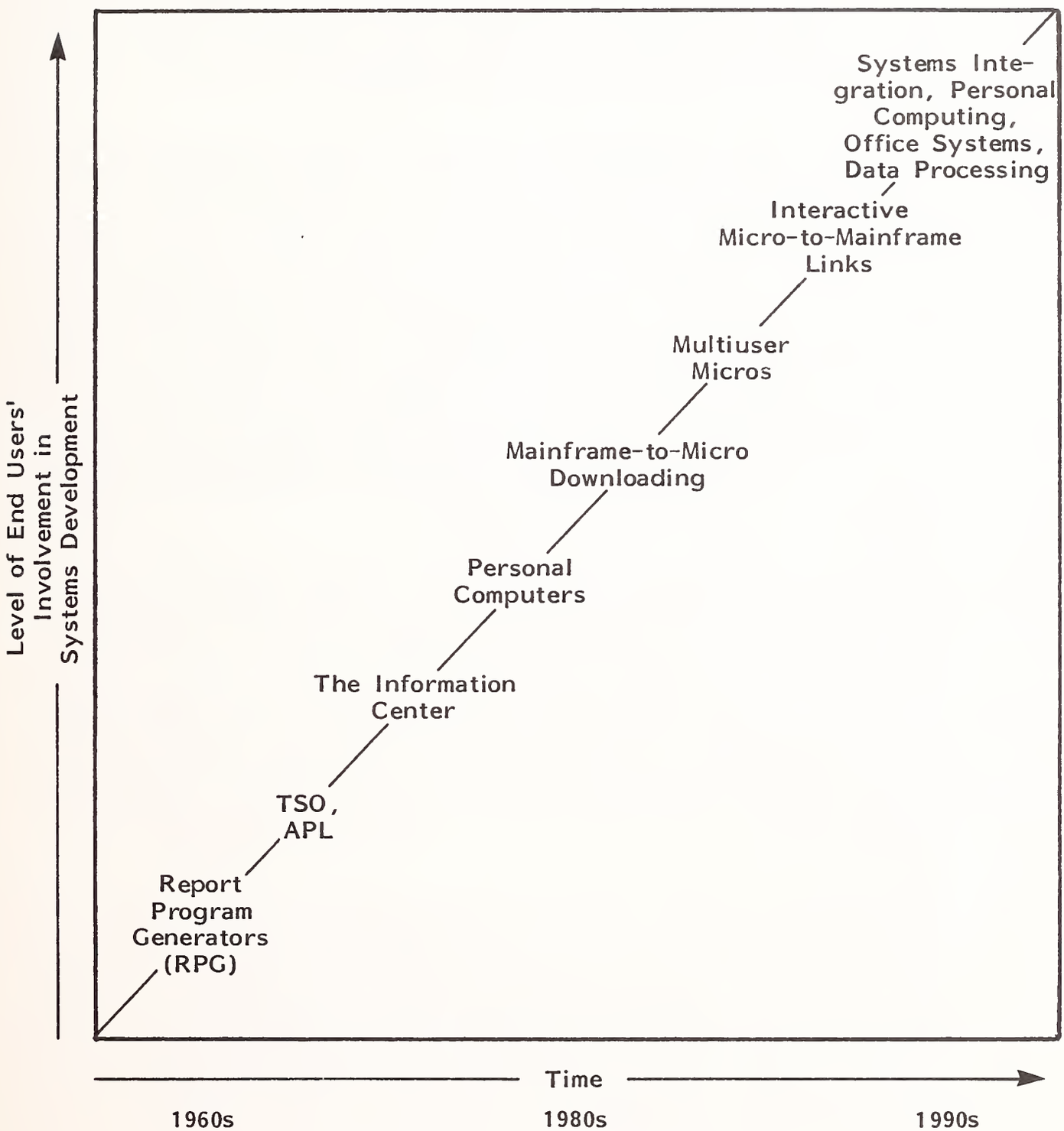
- As shown in Exhibit V-3 the information center is a major step in the overall evolution of end-user computing. INPUT is predicting that by the early 1990s IBM's software strategies will be characterized by integration and identified as the Electronic Office period. The Electronic Office period will emphasize the integration of data processing, office automation systems, communications systems, and manual (paper-based) systems into electronic systems.

- End-user computing is on an evolutionary path that can best be described as progressive integration: the parts become more dependent upon the whole. As the Electronic Office period matures, more complex systems will evolve that will require a more global view of the information and decision support needs of the organization.

- At each evolutionary phase of the Electronic Office period the merger between end-user computing and systems development comes closer. As micros are integrated into networks, they become more dependent upon the whole in terms of performance and services required. End users will have the freedom to continue to build their own decision support systems in the Electronic Office period, but their interaction with other micro users and with other data bases will have to be planned and controlled. Even the software they use will be more standardized to facilitate integration.

EXHIBIT V-3

END-USER COMPUTING EVOLUTION



D. WILL THE NEED VANISH?

- As micros play an increasingly important role in the decision making process of knowledge workers, the need for effective training programs and consulting service will grow. The need for a center where end users congregate to gain access to information processing resources will vanish.

- Most of the mainframe applications software vendors are providing interactive, bidirectional links from their mainframe packages to remote micros. Iterations of these products will make accessing mainframe data bases a simple, transparent process for end users. Security and data integrity will not be a problem, because the existing mainframe packages will provide all of the necessary features and will treat micros as additional video display terminals. The major mainframe software vendors, such as IBM, Cullinet, and Information Builders, are also marketing comprehensive microcomputer software to provide the end users with mainframe capabilities on their microcomputers.

- With micro-mainframe integration becoming a reality, INPUT believes that future corporate information systems projects will take microcomputer capability into consideration and take advantage of this resource. Future information systems builders will design the management information aspects of a system, with the microcomputer as the primary server. This means that end-user computing will become an extension of the systems development function.

- End users will still require assistance with the development of their piece of a corporate system, but consultants will be a part of the project development team rather than a separate information center. The emphasis will be on what the end user is trying to accomplish rather than how to use the microcomputer resource. The consultants will be oriented toward business analysis rather than product expertise.

- Computer-based training products will continue to improve and will have to become the primary method for teaching end users how to use and apply micro resources. IS will maintain hotline services to answer specific questions about the application of PC hardware and/or software, but the instructor-led classroom environment will become too expensive to continue, as the use of micros becomes more commonplace.

- INPUT believes the trend to offload decision-making information processing activities on the micro will create a mainframe capacity problem. Even though many of the management reporting and terminal inquiries will be replaced by decision support micro capabilities, mainframes will become overloaded by micro-mainframe link activities. This quandary will be eased through the advent of departmental processors that will service the local end users and be integrated into the host network. These departmental processors will also handle the voice, image, text, and data systems of the future integrated electronic offices.

- INPUT is predicting that the information center will be swallowed up by the integration of end-user computing, data processing, and office automation. This could be as early as 1990, but most certainly will take place by 1995.

- This doesn't mean that IS should immediately halt all information center activities; on the contrary, IS should continue to build a strong end-user support group, and at the same time, plan and schedule the steps toward the Electronic Office period.

VI CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

- The most active users of the information center are those associated with the middle management ranks. This includes managers, financial analysts, administrative assistants, and any other staff members that support middle management.

- This middle management group represents the majority of the information center clientele, because it is where most of the micros can be found--and micro activities have become the responsibility of the information center manager.

- When microcomputers began to surface, IS management viewed them as nothing more than a glorified desk calculator. When management became concerned with the number of microcomputers being acquired and the variety of incompatible products being used, the problem was given to the information center to solve.

- What is happening is that the information center is shifting its emphasis to micro-related activities. The micro user base is growing so rapidly that training these people, who are scattered all over an organization, has become one of the major concerns.

- Another end-user related service that is gaining momentum is the text, image, and voice processing aspects of office automation. Word processing, electronic mail, electronic filing, and automated administrative management are not only being accepted, they are becoming standard office methods. Because these services are directed at the end user, they too have been given to the information center to oversee.

- The end-user computing evolution is picking up speed, and the sharing of resources through LANs and multiuser microcomputer systems is the new wave, along with linking micros to mainframes. End users are starting to find ways to develop transaction-driven systems on their microcomputers, and bypass IS red tape.

- Vendors, including IBM, are seizing the opportunities created by the surge of interest in end-user computing and are developing products aimed at the integration of data processing, office automation, communication, and end-user computing. INPUT sees this integration coming to fruition in the early 1990s and is calling it the Electronic Office period.

- Once the line between end-user computing and corporate systems development is erased by the Electronic Office period, new systems will be developed that will encompass the needs of all organizational levels, from corporate headquarters to the individual.

- The central host mainframes will be unable to handle the processing load created by the Electronic Office period. Communications and mainframe loads will be alleviated by departmental processors, which will be linked to the mainframe and will service the local needs of work groups and individuals.

- Once end-user computing becomes intertwined with production systems and office automation, the related issues will become the responsibility of the systems development function, and the information center will disappear.

B. RECOMMENDATIONS

- Exhibit VI-1 lists the action steps that should be taken in preparation for the Electronic Office Systems period.

- Moving from standalone micros and information centers to an integrated Electronic Office Systems environment is an evolutionary process and requires transitional steps. IS should continue to staff the information center with skills required to train and support end users.

- The department responsible for IS training should evaluate the alternatives for training end users on micro and information center products and develop a training plan that will handle the anticipated increases in end-user computing.

- The major mainframe software vendors see the era of the integrated Electronic Office System approaching and are developing and marketing micro links as an extension of their mainframe products. Some are also making available micro software that will handle the needs of the individual and also interface with mainframe software (e.g., Cullinet's Goldengate and IDM, McCormack and Dodge's PC Link, and IBM's Attachment systems). IS should install links that are compatible with their existing mainframe environment.

- If not already in place, IS should install processors at the departmental level that are capable of accommodating office systems activity and micro integration. The following are some examples of vendors that have such systems.

  - IBM: System/36, 4300s.

  - DEC: All-In-1.

  - Data General: CEO.

  - Wang: OFFICE.

EXHIBIT VI-1

INTEGRATED ELECTRONIC OFFICE SYSTEMS ACTION STEPS

- Develop Organizational Plans that Align End-User Support with Systems Development.
- Continue to Build a Strong End-User Support Function.
- Concentrate on Developing a Plan for Training End Users.
- Acquire Micro-Mainframe Link Products that Are Compatible with Existing Software.
- Install Distributed Departmental Processors to Handle Office Systems.
- Build Communications Networks that Can Accommodate Future Electronic Office Systems.
- Develop Pilot System around the Capabilities of the Microcomputer.

- Communications network planning must be able to handle the integration of departmental processors, host mainframes, LANs, and micros.

- The end-user support function should not be isolated from the traditional systems development staff. These two groups must start collaborating. Each must be aware of the status of projects in the other group's area of responsibility.

- The integrated Electronic Office Systems period will cause a merger of the end-user support function into the systems development function and, therefore, IS organizational plans must identify how this will evolve. To start, the two functions should be reporting to the same manager.

- The end-user support and systems development staffs should jointly identify a business function within a department of the organization that would be a good prospect for a system designed around the capabilities of microcomputers. The system should include production transaction processing and decision support that requires access to mainframe data.

- What IS management is overlooking is an opportunity to exploit end-user computing rather than merely accommodate it. These new computing resources must be coupled with major production systems to produce ultimate integrated information systems.

- The microcomputer is in the process of eliminating the need for an information center, and the integrated Electronic Office System period will eliminate the need for a separate end-user support function. IS must be ready for each step of the end-user computing evolution.

About INPUT

INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

The company carries out continuous and in-depth research. Working closely with clients on important issues, INPUT's staff members analyze and interpret the research data, then develop recommendations and innovative ideas to meet clients' needs. Clients receive reports, presentations, access to data on which analyses are based, and continuous consulting.

Many of INPUT's professional staff members have nearly 20 years' experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.

Formed in 1974, INPUT has become a leading international planning services firm. Clients include over 100 of the world's largest and most technically advanced companies.

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